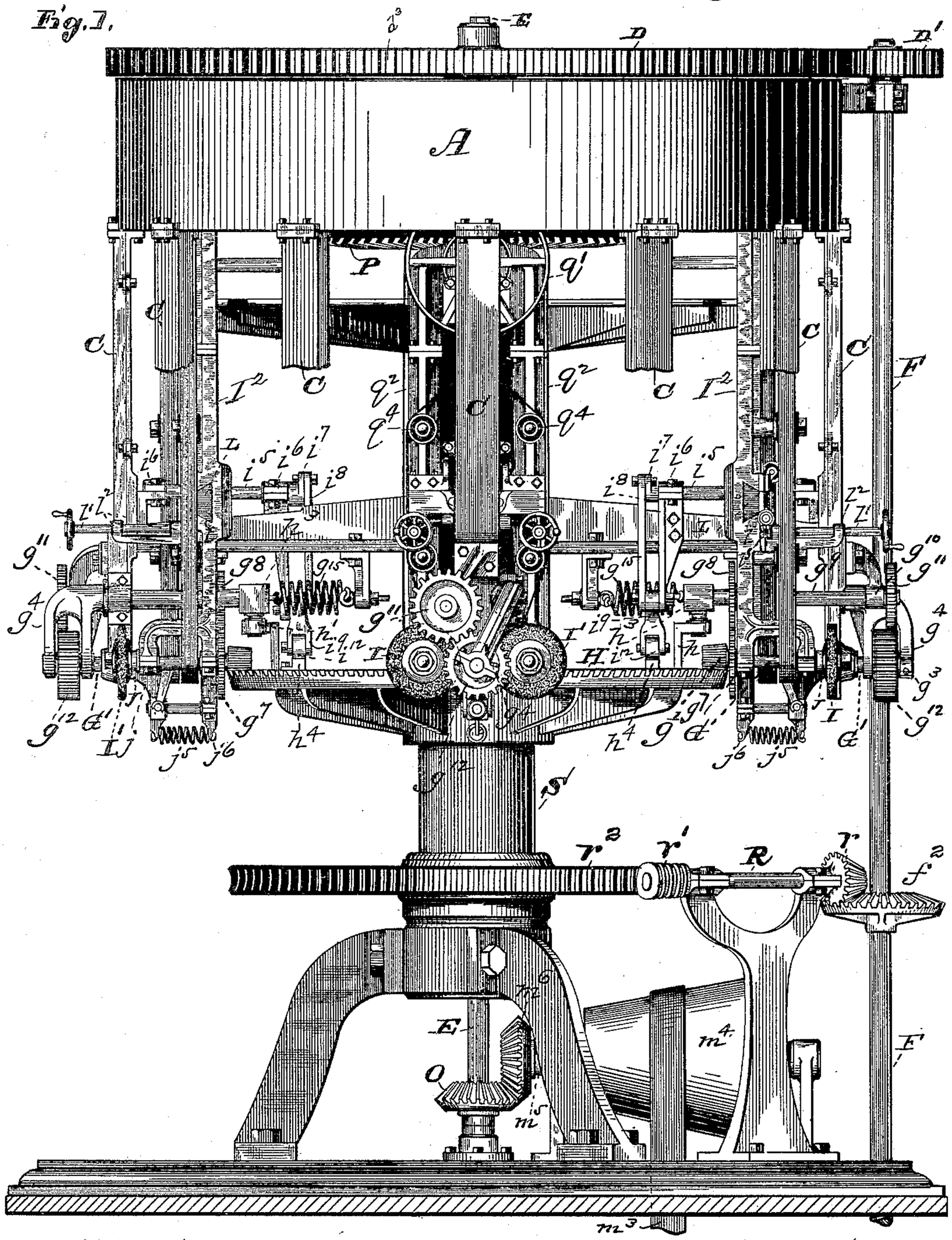
(No Model.) 8 Sheets—Sheet 1.

H. C. STIFEL.

MACHINE FOR GRINDING SHEAVES, &c.

No. 409,254. Patented Aug. 20, 1889.

Fig. 1.



Attest;
G. N. Hinchman Jr.
C. P. Moody

Inventor;
Herman C. Stifel

(No Model.)

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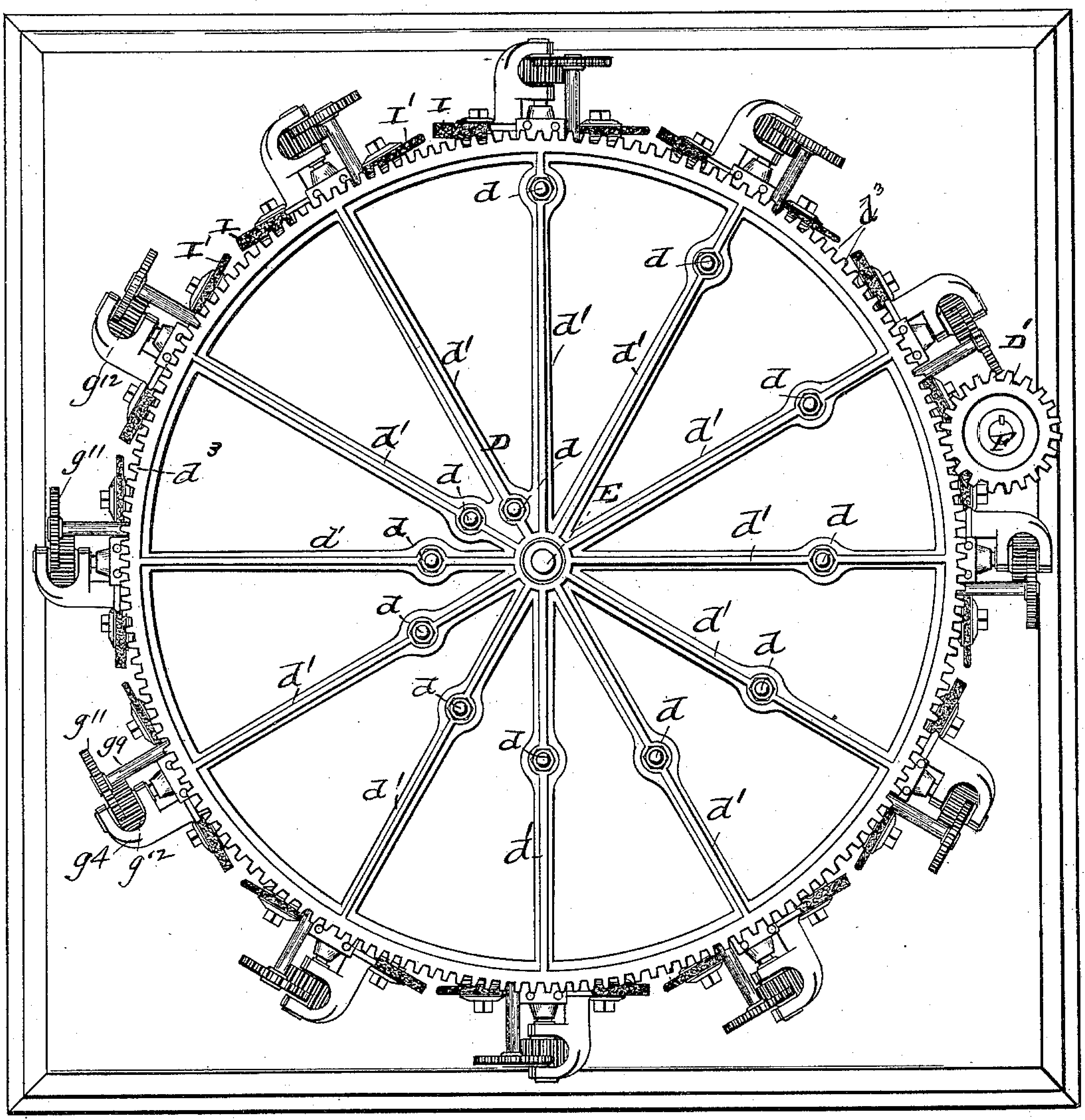
Fig. 2.



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Inventor:
Herman C. Stifel

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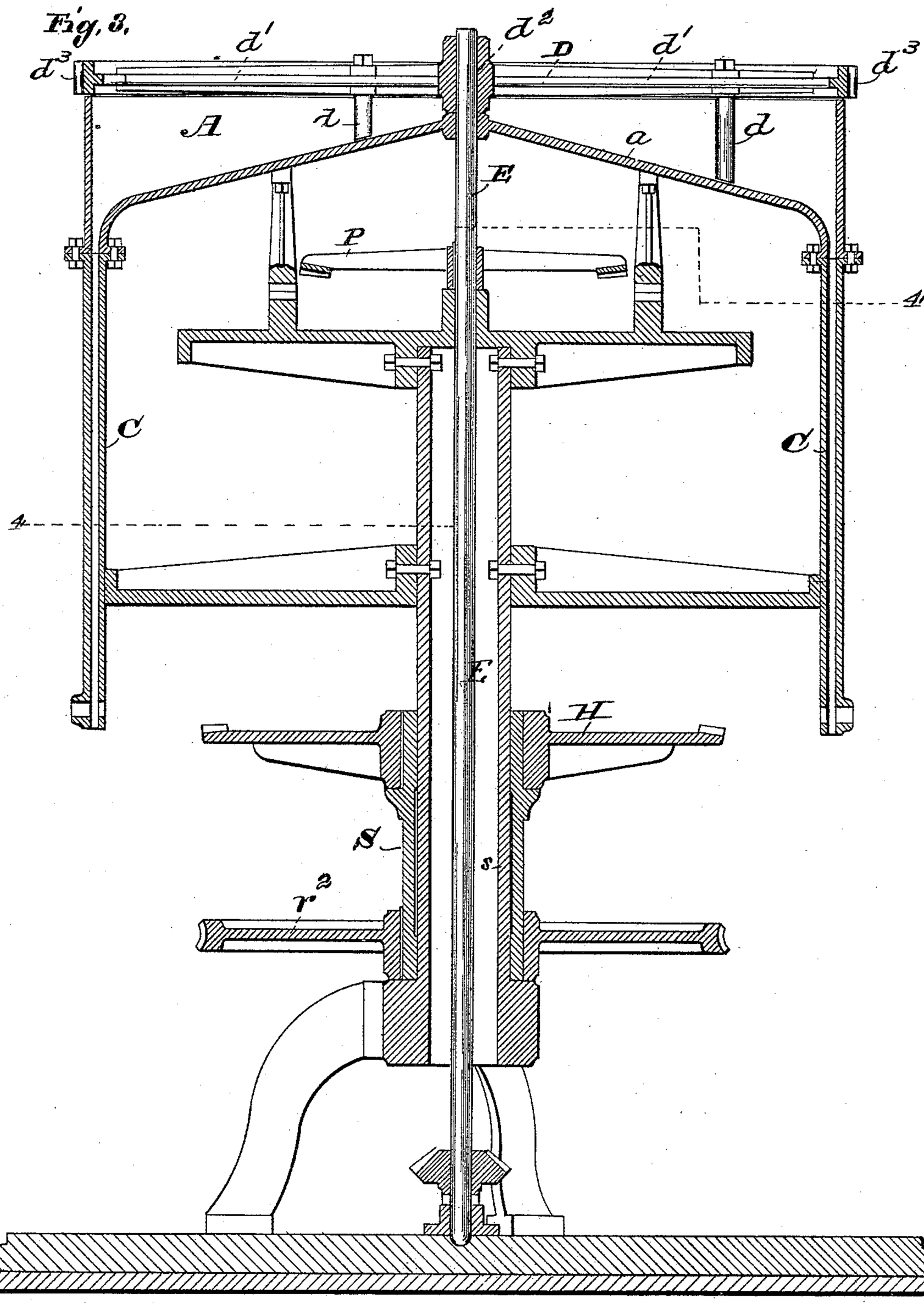
Fig. 3.



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(No Model.) 8 Sheets—Sheet 4.

H. C. STIFEL.

MACHINE FOR GRINDING SHEAVES, &c.

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Fig. 4.

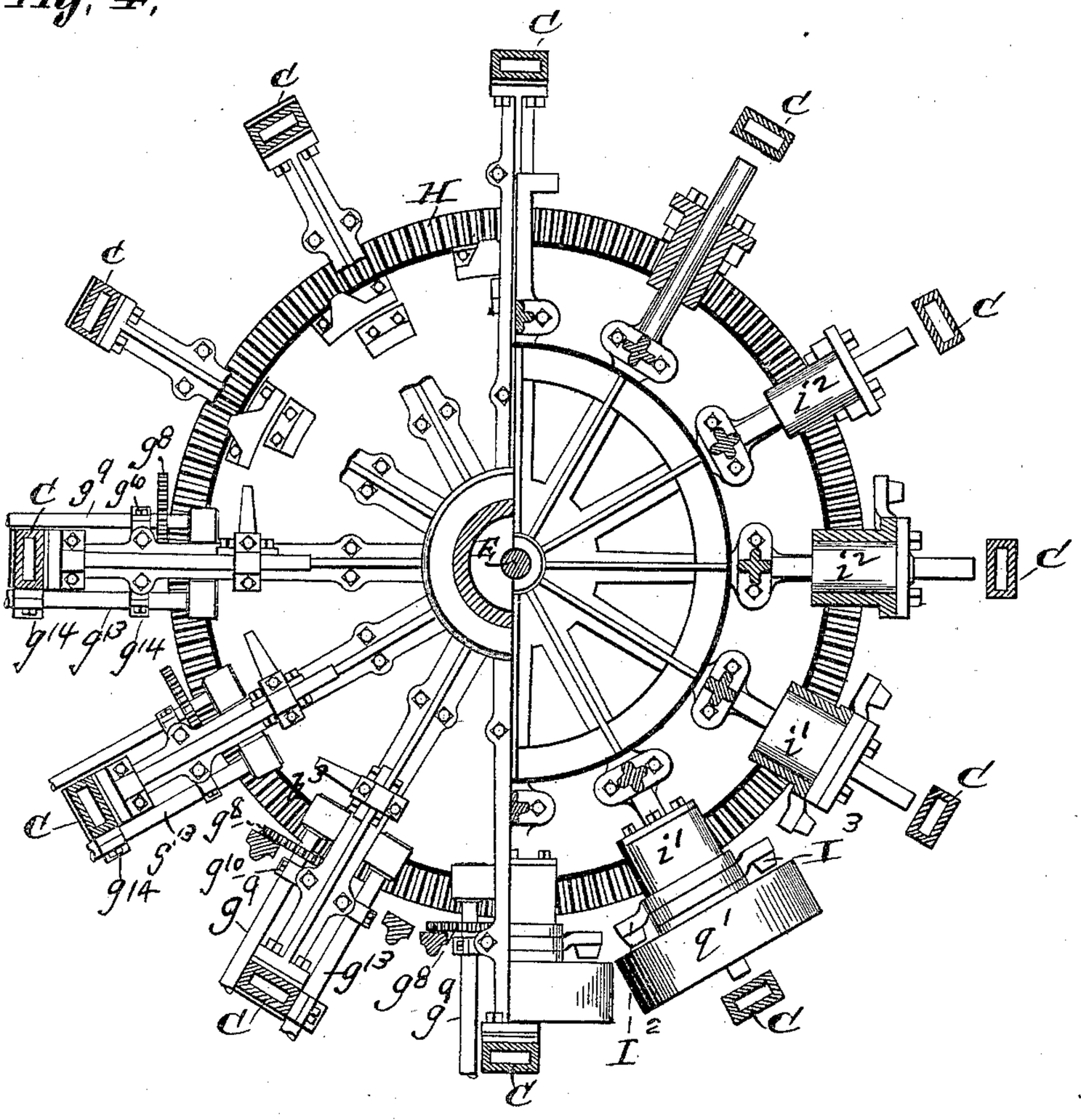

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Fig. 5.

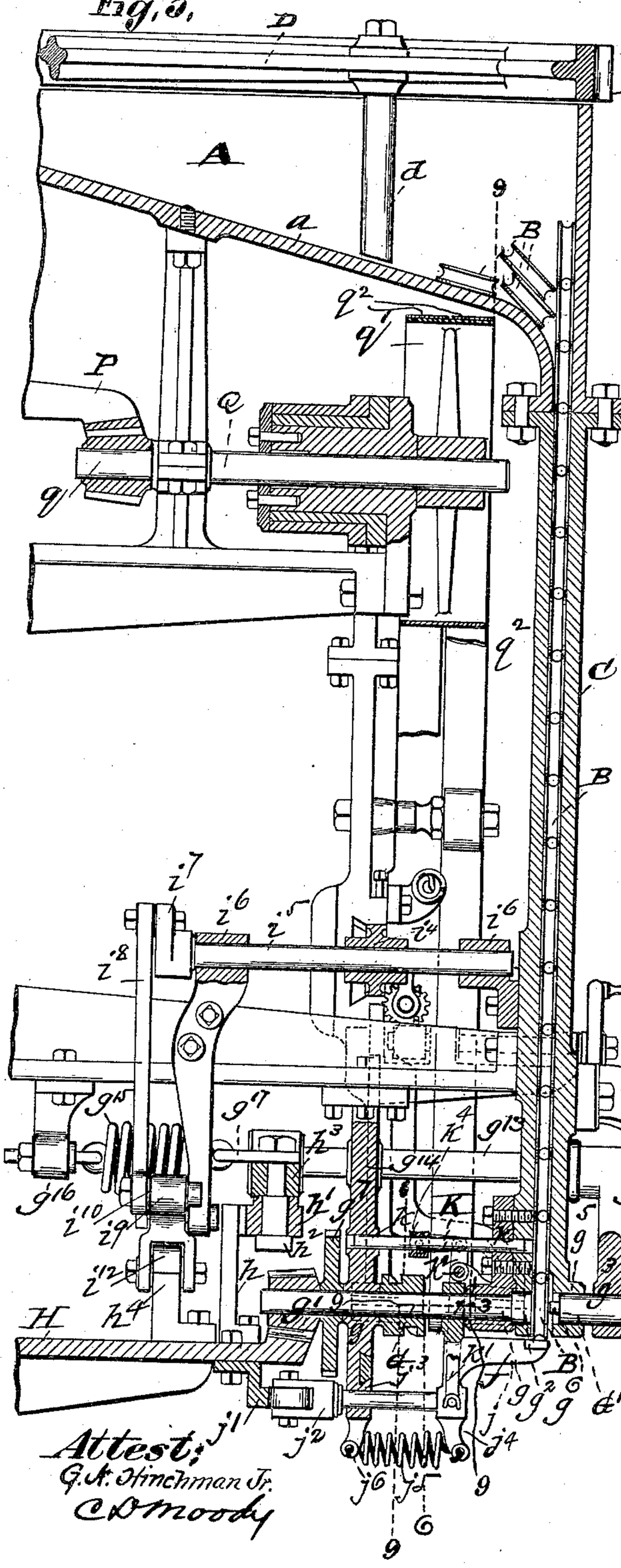


Fig. 6.

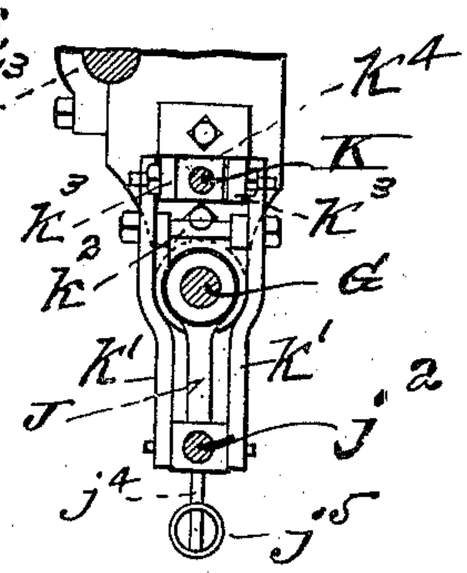


Fig. 7.

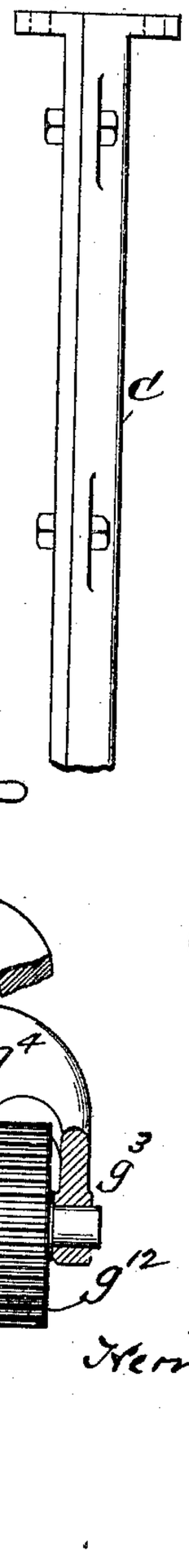
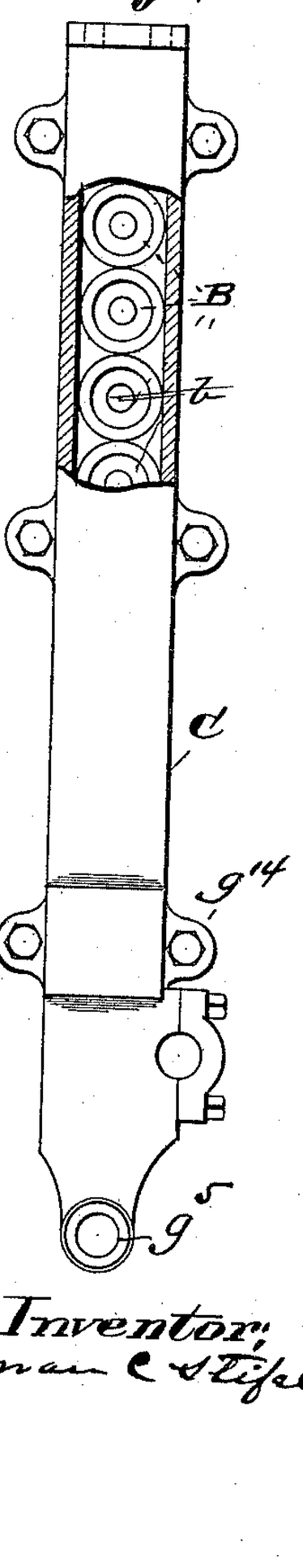


Fig. 8.



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MACHINE FOR GRINDING SHEAVES, &c.

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Fig. 9.

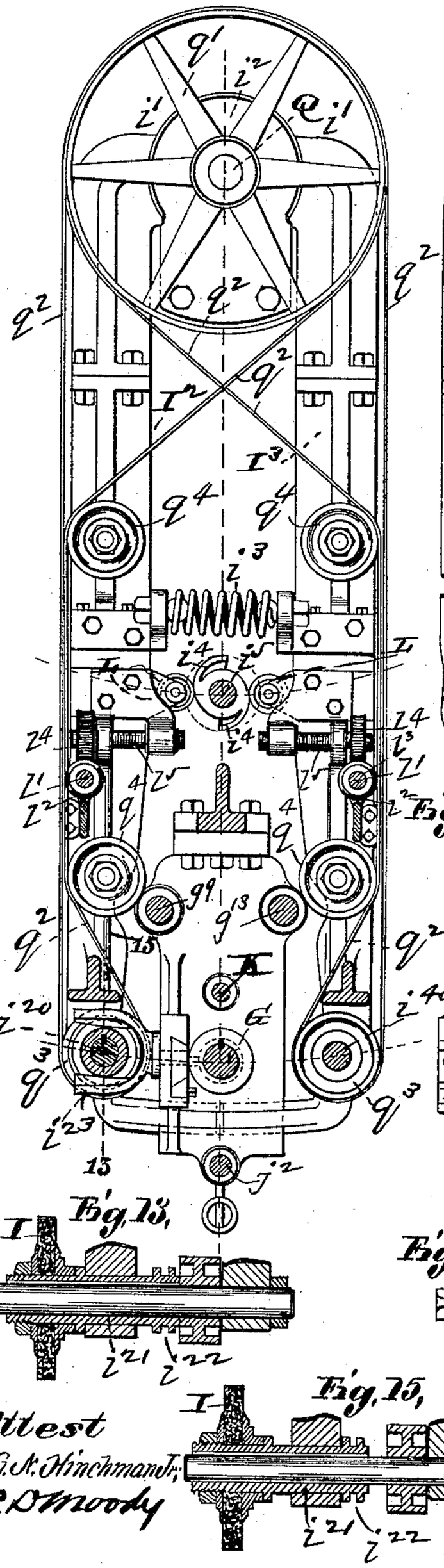

Fig. 10.

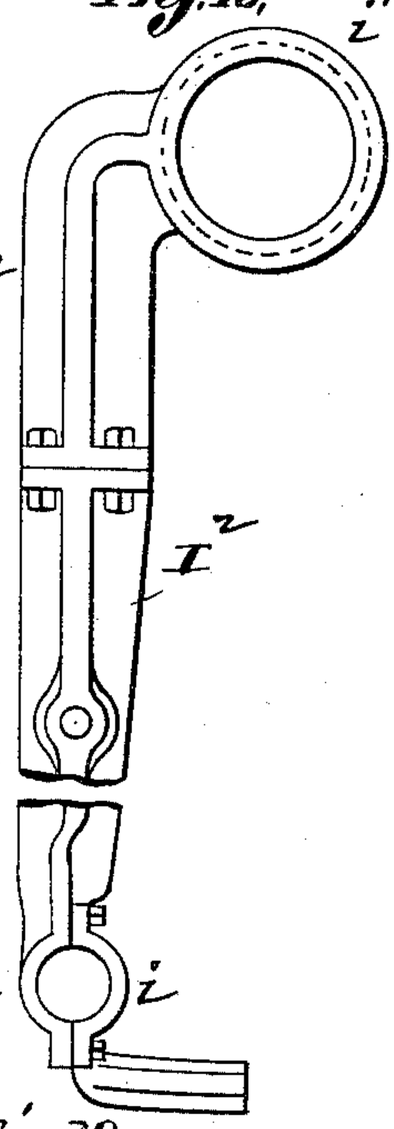

Fig. 11.

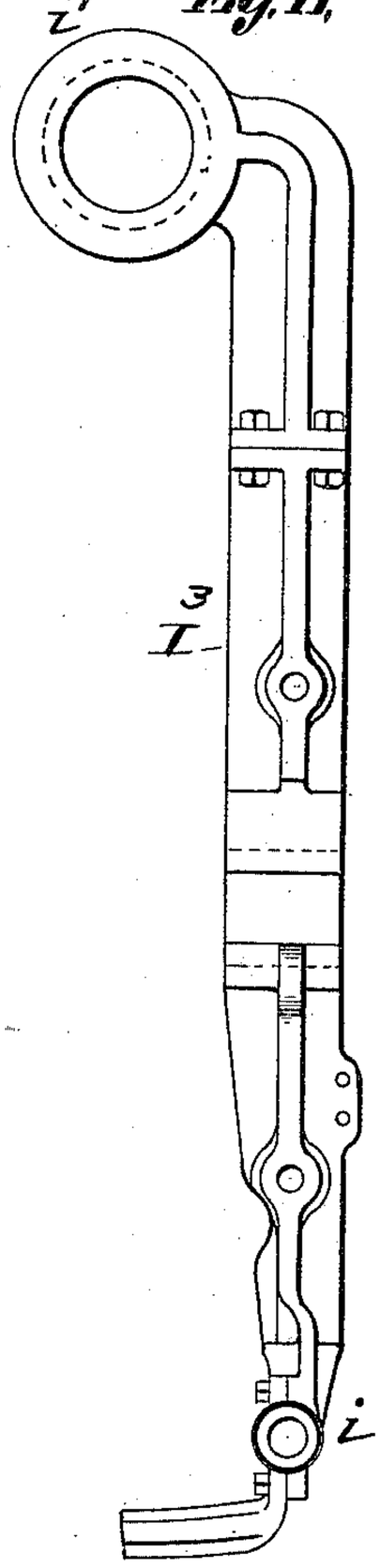

Fig. 12.

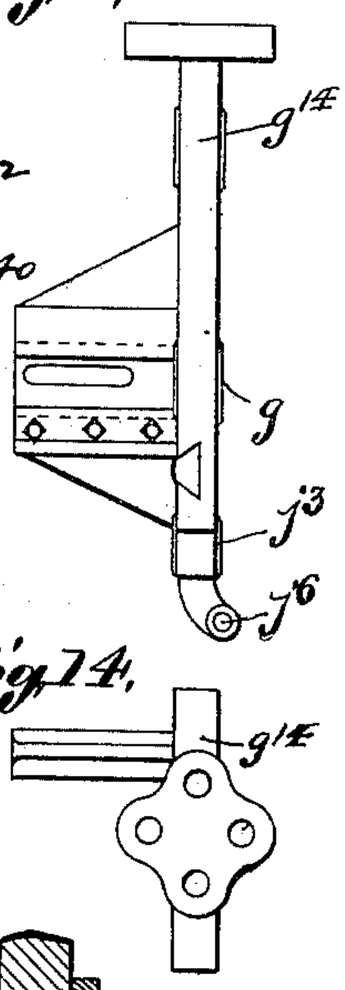

Fig. 13.

Fig. 14.

Fig. 15.

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No. 409,254. Patented Aug. 20, 1889.

Fig. 16.

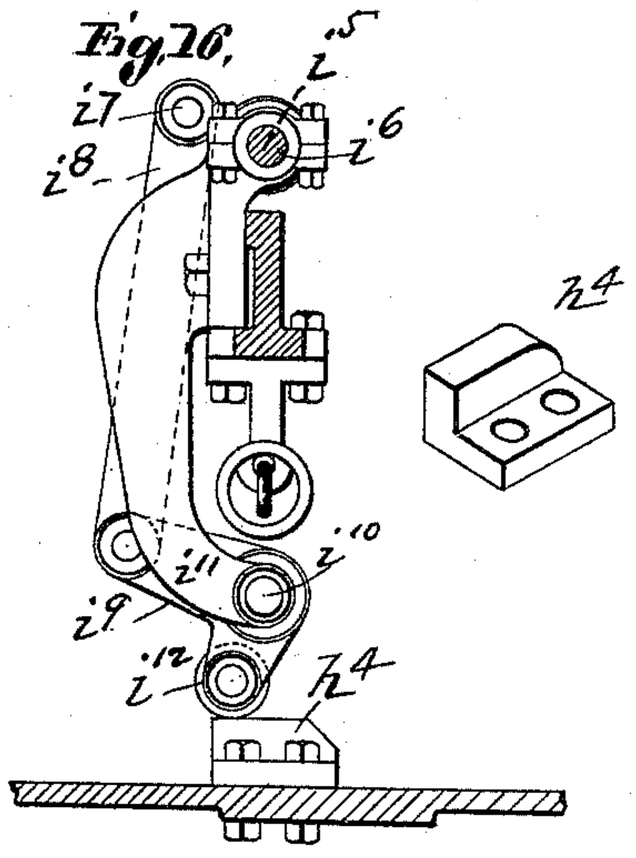

Fig. 17.

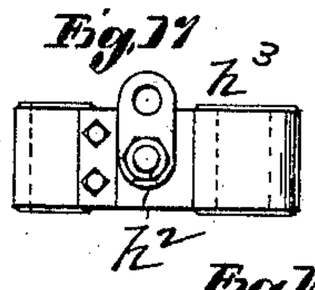

Fig. 18.

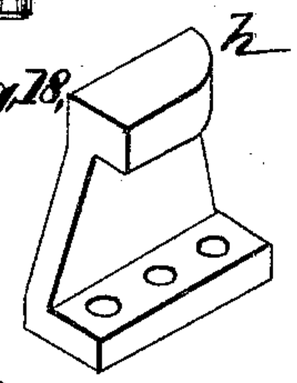

Fig. 19.

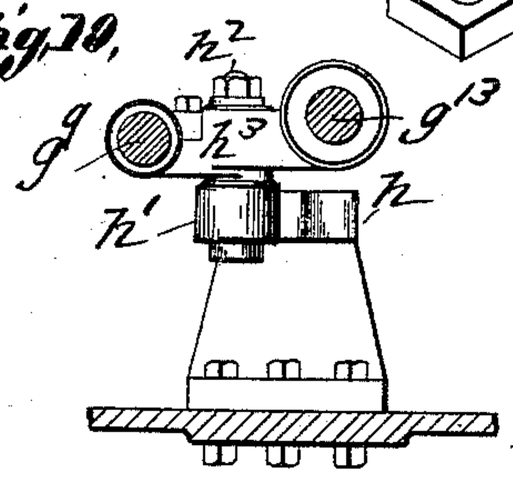

Fig. 20.

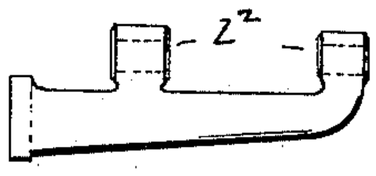

Fig. 21.

Fig. 22.

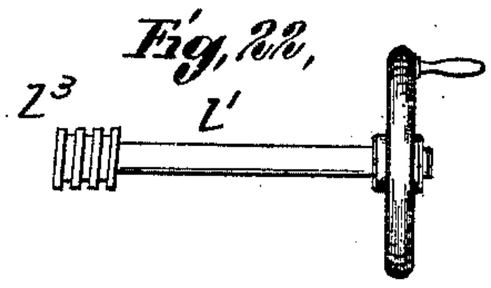

Fig. 23.

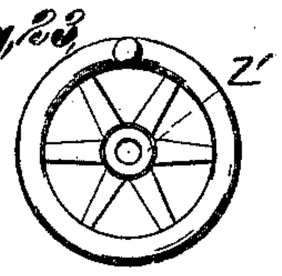

Fig. 24.

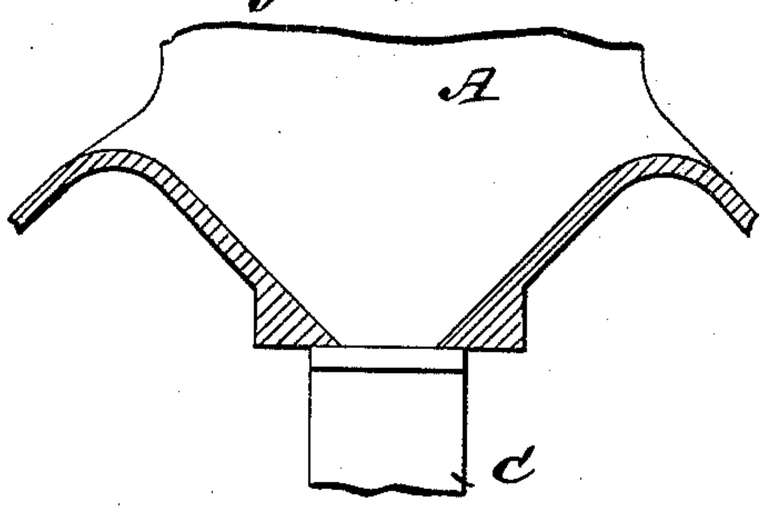

Fig. 25.

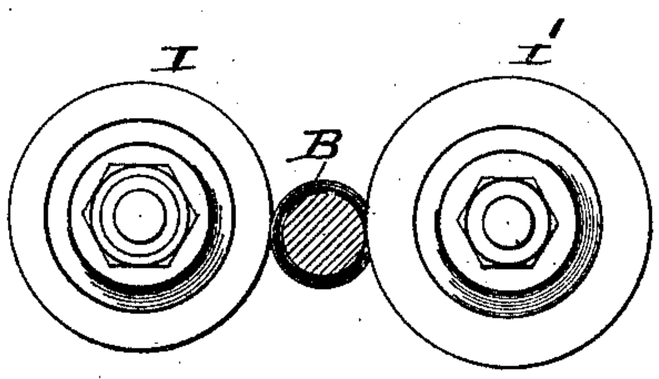

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Fig. 26.

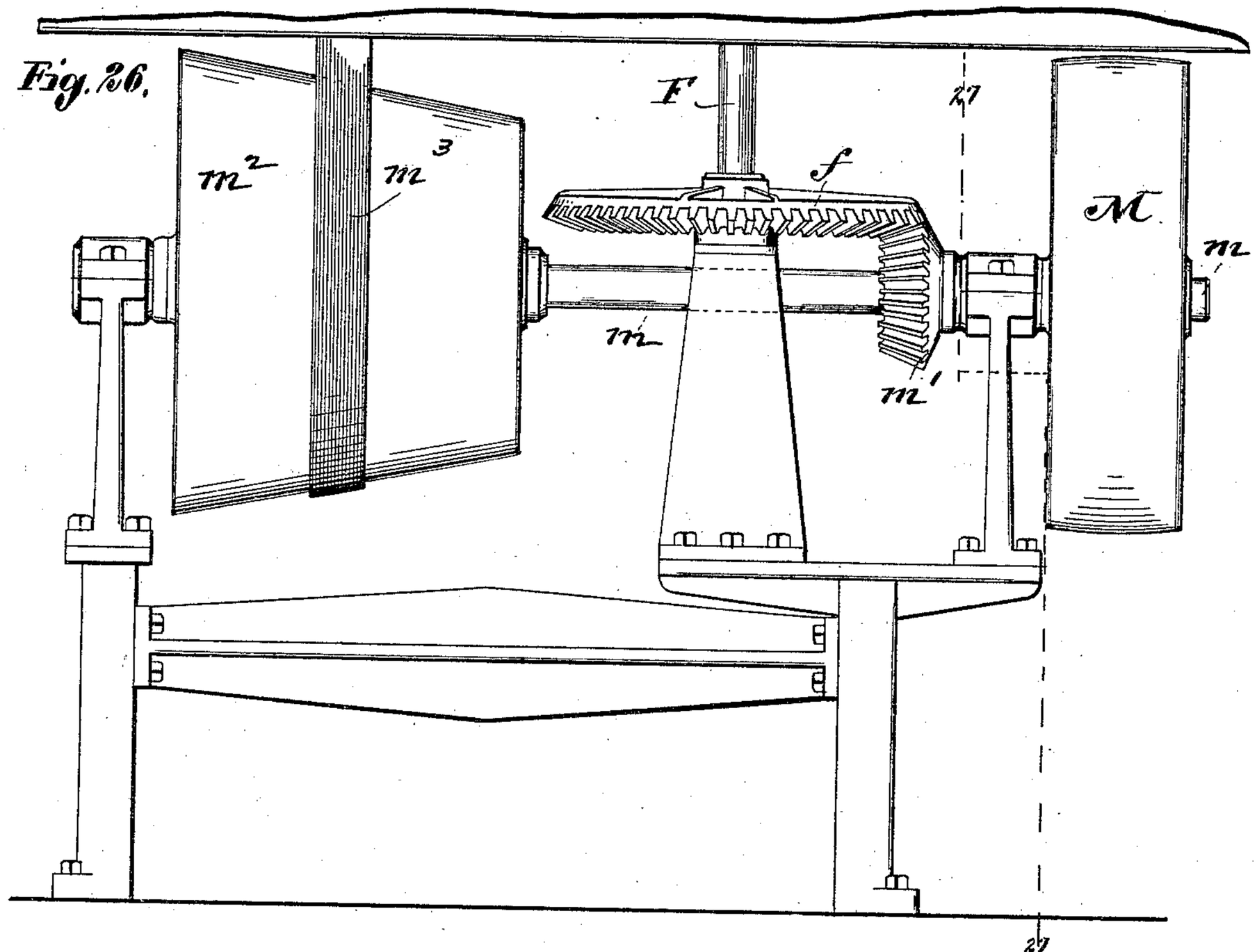
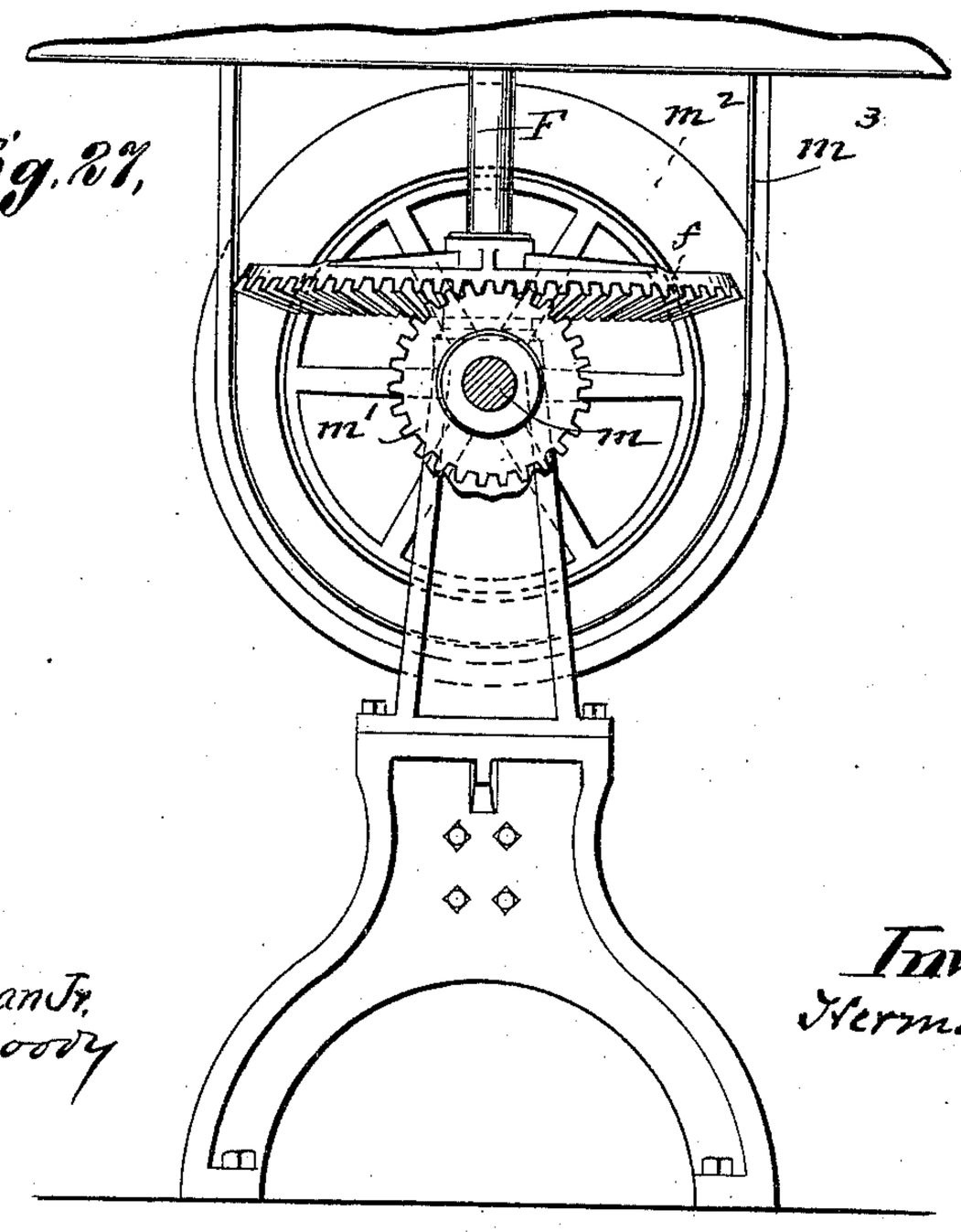


Fig. 27.



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UNITED STATES PATENT OFFICE.

HERMAN C. STIFEL, OF ST. LOUIS, MISSOURI.

MACHINE FOR GRINDING SHEAVES, &c.

SPECIFICATION forming part of Letters Patent No. 409,254, dated August 20, 1889.

Application filed November 27, 1888. Serial No. 292,010. (No model.)

To all whom it may concern:

Be it known that I, HERMAN C. STIFEL, of St. Louis, Missouri, have made a new and useful Improvement in Machines for Grinding Sheaves and Analogous Articles, of which the following is a full, clear, and exact description.

Considered generally, the improved mechanism is constructed and operated substantially as follows:

The sheaves to be ground are delivered into a hopper at the upper end of the machine. From the hopper the sheaves are fed successively downward into a chute. As each sheave arrives at the lower end of the chute, it is clamped laterally and subjected to the action of the grinding mechanism, which is designed to act upon the peripheral portion of the sheave, and to enable the entire peripheral portion to be presented to the grinding mechanism the sheave and its clamp are rotated during the grinding. After the sheaves are ground they are discharged from the machine, and as a finished sheave is discharged an unfinished one takes its place, to be acted upon by the grinding mechanism.

The capacity of the machine is increased by employing a series of grinding apparatuses in the place of a single one, all substantially as is hereinafter set forth and claimed, aided by the annexed drawings, making part of this specification, in which—

Figure 1 is an elevation of the improved machine, portions thereof being broken away and not shown to enable the remaining portions to be more readily understood; Fig. 2, a plan of the machine; Fig. 3, a central vertical section of the principal portion of the frame-work of the machine; Fig. 4, a horizontal section on the line 4 4 of Fig. 3; Fig. 5, a vertical section of one of the chutes and grinding mechanisms, the view including the adjacent parts; Fig. 6, a vertical section on the line 6 6 of Fig. 5; Fig. 7, an edge elevation of the upper portion of one of the chutes; Fig. 8, a side elevation of the chute, a portion of the wall being broken away; Fig. 9, a vertical section on the line 9 9 of Fig. 5; Fig. 10, a side elevation of one of the wheel-supporting arms of one of the grinding mechanisms; Fig. 11, a side elevation of the other wheel-supporting arm; Fig. 12, an elevation of one of the brackets used to support the sheave-clamping mechanisms; Fig. 13, a section on the line 13 15 of Fig. 9; Fig. 14, a plan of the bracket-chain in Fig. 12; Fig. 15, a section on the line 13 15 of Fig. 9, showing the parts in a different position from that of Fig. 13; Fig. 16, a vertical section showing the parts immediately used in operating the rock-shaft that is employed in opening the grinding-wheel arms apart; Fig. 17, a plan of the box which receives the inner end of the arm used in operating the movable part of the sheave-clamping mechanism; Fig. 18, a view in perspective of the cam used in moving in an outward direction the box of Fig. 17; Fig. 19, a front elevation of the parts of Figs. 17 and 18 shown together; Fig. 20, a side elevation of the bracket for the hand-wheel used in adjusting the grinding-wheel arms when the wheels are worn; Fig. 21, a front elevation of the same; Fig. 22, a side elevation of the hand-wheel and worm-shaft used in the bracket of Figs. 20 and 21; Fig. 23, an end elevation of the same; Fig. 24, a vertical section of the hopper at one of the chutes; Fig. 25, a side elevation of a pair of grinding-wheels and showing a sheave in position for being ground; Fig. 26, an elevation of the mechanism for driving the various mechanisms of the machine; Fig. 27, a vertical section on the line 27 27 of Fig. 26.

The views are upon various scales.

The same letters of reference denote the same parts.

The hopper.—At the upper part of the machine is the hopper A, Figs. 1, 3, 5, and 24, for receiving the sheaves to be ground. Its bottom *a* is crowned to facilitate the delivery of the sheaves B, Figs. 3, 5, 8, and 25, into the chutes C, Figs. 1, 3, 4, 5, 7, and 8, and to insure the transfer of the sheaves a stirring device D, Figs. 2, 3, and 5, is employed. This device consists, essentially, of a series of fingers *d d d*, &c., attached to a frame, by means of which the fingers are moved around within the hopper and in contact with the sheaves therein, and so as to urge them in the direction of the chutes. A desirable frame is that shown in the drawings. The fingers at different distances respectively from the wheel-center are attached respectively to the spokes *d'* of a wheel arranged horizontally above the hopper and to turn on a bearing d^2 upon the upper end of

the vertical shaft E, and at its periphery provided with teeth d^3, to enable it to engage with and be driven by a pinion D′, which is fast upon an upright shaft F.

The chutes.—A series of chutes are preferably employed. In the present instance there are twelve chutes arranged to form a circular series extending around the machine. They are shaped in cross-section to receive and to guide the sheaves in an upright position, Figs. 5 and 8, downward, and to deliver them successively to the clamping mechanism, Figs. 1 and 5, belonging to the chute, for with each chute is a complete mechanism for holding the sheaves and grinding them and then discharging them from the machine.

The clamping mechanism is the means for holding and rotating the sheave as it is being ground. To this end the sheave is clamped sidewise and so as to expose its peripheral portion, and as follows: G represents a shaft journaled in bearings g g, provided at its inner end with a bevel-pinion g', and at its outer end g^2 adapted to form a shoulder against which the sheave can be pressed laterally when it has dropped to the lower end of the chute. G′ represents another shaft journaled at g^3 in the bracket g^4, and having its inner end projecting through an opening g^5, Figs. 5 and 8, in the lower end of the chute, and at its extreme inner end g^6 shaped to enter the central opening b in the sheave and be pressed snugly thereinto. In Fig. 5 the shaft G′ is shown pressed endwise against the sheave, and the sheave thereby pressed against the shaft G. When the sheave is thus held, it is caused to rotate with the shafts G G′. The shaft G is driven by means of the horizontal bevel-gear H, Figs. 1, 3, 4, and 5, and while the sheave can be rotated to some extent when the shaft G only is driven, and the shaft G′ is used only as a means for producing lateral pressure upon the sheave, it is better to have both of the shafts G G′ driven, and driven uniformly. Accordingly the shaft G is provided with a gear g^7, which engages with and drives a gear g^8 upon a shaft g^9, Fig. 1. This last-named shaft is held and adapted to be rotated in bearings g^{10}, Fig. 4, and at its outer end provided with a gear g^{11}, which engages with a gear g^{12} upon the shaft G′. By reason of this construction the shaft G′ is caused to follow the shaft G in its rotation. When it is desired to release the sheave, the shaft G′ is moved endwise away from the shaft sufficiently for the inner end of shaft G′ to clear the sheave, whereupon the sheave can drop out of the clamp. The means adapted for thus moving the shaft G′ are as follows: The gear H is provided with a cam h, Figs. 5, 18, and 19, which as the gear H rotates encounters a roller h', Figs. 1, 5, and 19, upon a stud h^2, which is held in a box h^3, and thereby moves the box outwardly in the machine. The box is secured to the inner end of the shaft g^9, and also to the inner end of an arm g^{13}, which passes outward through bearings g^{14} g^{14}, and at its outer end supports the bracket g^4. The parts g^9 and g^{14} are moved outwardly with the box h^3, and the sheave thereby released. As soon as the cam h passes the roller h' the spring g^{15}, Figs. 1 and 5, which at its inner end g^{16} is secured to the frame of the machine and at its outer end g^{17} to the box h^3, acts to draw the box h^3 and the parts g^9 g^{13} inwardly into their original position and to effect the clamping of the next sheave.

The grinding mechanism.—The parts constituting the grinding mechanism are shown in Figs. 1, 2, 4, 9, 10, 11, 13, 15, and 25. The parts which do the actual grinding are the emery-wheels I and I′. The wheel I′ is used for grinding the concave portion of the face of the sheaves and the wheel I for grinding the sheave-face at each side of the groove. To enable the wheels to be closed against the sheave when it is desired to grind it and to be opened away from the sheave when it is desired to release the sheave, the wheels are respectively journaled in the arms I^2 I^3 at the lower end i thereof and the arms in turn, and at the upper end i' thereof are journaled side by side upon a bearing i^2, arranged toward the upper part of the machine. By swinging the arms I^2 I^3 upon their bearing the wheels I I′ can be adjusted for the purposes mentioned. The arms are closed toward each other by means of the spring i^3, Fig. 9, which serves to elastically unite the arms, and to open the arms apart the cam i^4, Fig. 9, is employed. The cam is fastened upon the rock-shaft i^5, Figs. 9, 1, 5, and 16, by oscillating which the cam can be turned to open the arms I^2 I^3 apart and allow them to close toward each other. The rock-shaft is journaled in suitable bearings i^6, Figs. 1, 5, and 16, and it is operated as follows: The rock-shaft is provided with a crank i^7. A connecting-rod i^8 leads from the crank i^7 to a bell-crank lever i^9, which is at i^{10} pivoted to a bearing i^{11} and is provided with a roller i^{12}. As the gear H rotates, a cam h^4, Figs. 1, 5, and 16, upon it encounters the roller i^{12} and causes the bell-crank to turn on its pivot i^{10}, and the rock-shaft and cam i^4 thereby to turn and effect the opening apart of the arms I^2 I^3. As soon as the cam h^4 passes the bell-crank i^9, the spring i^3 acts, as described, to close the arms I^2 I^3 toward each other. The movements of the grinding mechanism and the movements of the clamping mechanism, above described, are suitably synchronized.

The chute-closing mechanism.—As the sheaves successively drop into position to be clamped and ground, provision is made for arresting and holding them at the proper level until firmly stamped and ground. For this purpose a gate J, Figs. 1 and 5, is employed. The gate is hung on the shaft G and is movable longitudinally thereon to enable its arm j to close the chute, as represented in Fig. 5, and to be withdrawn to open the chute. A cam j', upon the gear H, encounters in the rotation of the gear a thrust-bolt j^2, which works through a bearing j^3 and is fast-

ened to the arm j^4 of the gate and causes the gate to be closed. After the cam j' passes the thrust-bolt the spring j^5, which leads from the gate-arm j^4 to a bearing j^6, acts to open the gate. As the lowest sheave in the chute is discharged therefrom, it is desirable to prevent the succeeding sheaves from dropping into the chute until the gate is again about to close. Accordingly a pin K, Fig. 5, is operated to move outward in the bearings k and encounter and bind that sheave which is next to the sheave being discharged when the gate is opened.

The pin K is preferably operated, as described, in the following manner: Arms K′ K′, Figs. 5 and 6, which are pivoted at K^2 to a fixed bearing, are jointed at the lower end to the gate J and at the upper end to links k^3 k^3, Fig. 6, which in turn are jointed to a block k^4, attached to the pin K. Then when the gate is withdrawn to open the chute the arms k' are turned on their pivot and the pin K is thereby moved outward to bind the sheave.

The grinding-wheel adjustment.—As the wheels I I′ wear away, provision is made for adjusting the wheel-arms I^2 I^3 to compensate for the wear. The cam i^4 upon the rock-shaft i^5, instead of acting directly upon the arms I^2 I^3, is adapted to encounter an adjustable shoulder L, Figs. 1 and 9, upon the arms I^2 I^3. There being two arms I^2 and I^3, the cam I^4 is a two-part one, as shown, and the parts are adapted to respectively act upon the arms I^2 and I^3, and each arm is provided with a shoulder L. The shoulder is adapted to be moved in a groove l in the arm toward and from the rock-shaft and to be held at any desired point of adjustment.

The means shown for shipping the shoulder L are as follows: A shaft l', Figs. 1, 9, 22, and 23, journaled in a bearing l^2, is provided with a worm l^3, which engages with a gear-nut l^4 upon a screw l^5, which is attached to the shoulder L. By rotating the shaft l' the shoulder is adjusted upon the arm I^2. That one of the grinding-wheels which is used to grind the sheave-face at the sides of the groove therein must have a lateral play, in order that the wheel-face shall wear evenly. To this end the wheel I is not attached directly to its shaft i^{20}, Figs. 13 and 15, but to a sleeve i^{21}, which is feathered on the shaft, to be moved longitudinally upon and to rotate with the shaft, and is provided with a cam-groove i^{22}, Figs. 13 and 15, in which a clutch-lever i^{23}, Fig. 9, engages. Then as the wheel-shaft i^{20} rotates, the clutch-lever, by mechanism not shown, operates to shift the sleeve reciprocatingly upon the shaft i^{20}, and thereby to shift the wheel I to and fro, as indicated by its two positions, shown respectively in Figs. 13 and 15.

The driving mechanism.—Power is communicated to the machine by means of the pulley M, Figs. 26 and 27, which is fast upon the shaft m, which in turn is provided with the bevel-gear m' and the cone-pulley m^2, by which means the rotation of the shaft m is transmitted in two different directions. The gear m' drives a bevel-gear f upon the upright shaft F, Figs. 26, 27, 1, and 2, upon whose upper end is the pinion D′, which drives the gear D. The cone-pulley m^2, by means of a belt m^3, communicates its motion to a cone-pulley m^4, Fig. 1, which is fast upon a horizontal shaft m^5. This last-named shaft is provided with a bevel-pinion m^6, which drives a bevel-pinion O, fast upon the upright shaft E, Figs. 1, 2, 3, and 4. This shaft at its upper end, as stated, provides a bearing for the gear D to be turned thereon, and beneath the hopper A the shaft has fastened to it the bevel-gear P, Figs. 3, 1, and 5. This last-named gear, therefore, rotates with its shaft E and serves, through the bevel-pinion q, to drive the horizontal shaft Q, Figs. 5 and 9. The shaft Q is provided with a pulley q', from which belts q^2 lead to and around the pulleys q^3 q^3, Fig. 9, upon the wheel-shafts i^{20} i^{40} respectively. The grinding-wheels are thereby driven from the shaft Q. The belts are respectively carried past idler-pulleys q^4 q^4 and around a wheel-shaft pulley q^3, as shown. In this manner the grinding mechanism is driven. The mechanism Q q, &c., is duplicated for each grinding mechanism. The upright shaft F is also provided with a bevel-gear f^2, which drives, through the medium of a bevel-pinion r, Fig. 1, a shaft R, having a worm r', which engages with and drives a horizontal gear r^2, Figs. 1 and 3. This last-named gear and the gear H, above described, are both fastened upon an upright sleeve S, journaled upon the bearing s, Fig. 3. The gear H thereby is driven from the shaft F, and its motion in turn effects the rotation of the clamp-shafts G′, Figs. 1 and 5, as well as the other various movements above set forth.

I claim—

1. The combination of the hopper, the series of chutes, the shafts E F, the pinion D′, and the gear D, having the fingers d d, substantially as described.

2. The combination of the chute, the shafts G G′ g^9, the pinion g', the bracket g^4, the gear H, and the gears g^7 g^8 g^{11} g^{12}, substantially as described.

3. The combination of the gear H, the cam h, the roller h', the stud h^2, the box h^3, the shaft g^9, the arm g^{13}, the bracket g^4, and the spring g^{15}, substantially as described.

4. The combination of the chute, the wheels I I′, and the journaled arms I^2 I^3, substantially as described.

5. The combination of the clamping-shafts G G′ and the grinding-wheels, one of said shafts being adjustable toward and from the other and both of them being rotatory, and said wheels being held in arms capable of being moved toward and from each other, substantially as described.

6. The combination of the chute, the grind-

ing-wheels and their journaled arms, the spring i^3, and the cam i^4 and its shaft, substantially as described.

7. The combination of the chute, the grinding-wheels and their journaled arms opening apart from and closing toward each other, as described, the clamping-shafts, and the chute-gate, one of said shafts being adjustable toward and from the other, and both of the shafts being rotatory, and said gate being made to close and open said chute, substantially as described.

8. The combination of the gear H, the cam h^4, the roller i^{12}, the bell-crank i^9, the journaled arms I^2 I^3, the rock-shaft i^5, the cam i^4, the spring i^3, the crank i^7, and the rod i^8, substantially as described.

9. The combination of the gear H, the cam j', the thrust-bolt j^2, the spring j^5, the gate J, and the chute, substantially as described.

10. The combination of the grinding-wheels and their arms, the adjustable shoulders L, and the rock-shaft and cam i^4, and spring i^3, substantially as described.

11. The combination of the arm I^2, the adjustable shoulder L, the shaft l', the worm l^3, the nut l^4, and the screw l^5, substantially as described.

12. The combination of the grinding-wheels and the arms I^2 I^3, one of said wheels being adjustable laterally to enable it to wear evenly, substantially as described.

13. The combination of the shaft E, the gears P q, the shaft Q, the pulley q' q^3 q^3, the belts q^2, and the arms I^2 I^3, substantially as described.

14. The combination of the shafts R F, the gear r^2 f^2 H, the pinion r, the worm r', and the sleeve S, and its bearing, substantially as described

Witness my hand this 3d day of November, A. D. 1888.

HERMAN C. STIFEL.

Witnesses:
C. D. MOODY,
B. F. REX.